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NEW WHEAT VARIETIES PASS THROUGH MILL
OF SCIENTIFIC AND TECHNICAL TESTING

Just as wheat kernels go through a series of milling processes on their way to flour production, so each new wheat variety must go through a mill of scientific and technical tests before it goes on the market. Samples of the new wheat are taken all the way from the greenhouse, where it is bred, through nursery rows and field plots, where it is grown experimentally, to the farmer's field. These samples are milled and baked according to accepted commercial practice, in small-scale machinery set up for the purpose in laboratories of the U. S. Department of Agriculture and of the State agricultural experiment stations that cooperate with the Department in developing improved wheat varieties. The aim of this cooperative program is the development of varieties that will resist the crop's major hazards - disease, notably rust and smut, drought, storm, insects, and winterkilling - and possess good milling and baking qualities.

More than 50 such varieties have been distributed to American farmers in the past decade. They increased our total wheat production by more than 800 million bushels in the 5-year period 1942 to 1946, according to J. Allen Clark, wheat breeder of the U. S. Department of Agriculture. This cereal breeding and testing work, Dr. Clark explains, is closely coordinated in each of the four main wheat-growing regions - hard red spring, hard red winter, soft red winter, and western. Dr. Clark is in charge of the Federal-State project in the hard red spring wheat region, which includes Wisconsin, Minnesota, North and South Dakota, Montana, Wyoming, Colorado, and Nebraska. Representatives from the U. S. Department of Agriculture, the Hard Red Spring Wheat States, and members of the Northwest Crop Improvement Association work together to give farmers of the region new varieties of wheat that are suited to their modern harvesting methods, that are resistant to disease and insect attack, that yield well, that have stiff straw, and that have good milling and baking qualities.

A conference of the hard red spring workers is held yearly in Minneapolis. These workers include Federal and State agronomists, cereal pathologists, and cereal chemists who develop and select the varieties on the basis of their disease resistance, yield, and quality. The Northwest Crop Improvement Association, sponsored by commercial flour millers, decides, on the basis of commercial milling and baking tests, which varieties they recommend to farmers of the region. Each year the association prepares a variety poster listing the favorite wheats and distributes it for display in country grain elevators and county agricultural agent offices. The 1948 poster, under the heading "Plant the Best Hard Spring Wheats in 1948," lists 8 new varieties developed in the last 20 years. Four of them - Rival, Mida, Pilot, and Cadet - were bred in cooperative experiments with the North Dakota Agricultural Experiment Station.

The accompanying pictures show some of the steps in the development of varieties at Fargo, as well as some of the milling, baking, chemical, and physical tests for all new wheat varieties as conducted in the laboratories at the Agricultural Research Center, Beltsville, Maryland.

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(EDITORS AND WRITERS: You may obtain 8x10 glossy prints of any of the pictures here shown free on request to Press Service, Office of Information, U. S. Department of Agriculture, Washington 25, D.C.)

- (1) Pollen from the head of a wheat of one variety is transferred to that of another - the first step in developing a new variety.
- (2) New wheat seedlings are inspected for rust-resistant plants.
- (3) Characteristics of a new wheat ready for harvest in an experimental field are noted and recorded.
- (4) Wheat of a new variety is harvested by hand in the experimental field.
- (5) Yields of a new variety wheat are recorded and samples for official tests are prepared, with some left over for another year's seeding.
- (6) Small quantities of a new wheat are milled for quality tests. 100 grams of the grain are run through a micro-mill - one of three such mills in the world.
- (7) Special tests on a new wheat variety include one to determine the quality of macaroni that can be made from it.

Samples of wheat of the new varieties developed at agricultural experiment stations in the producing areas are sent to the milling and baking laboratories of the U. S. Department of Agriculture at Beltsville, Md., which are equipped to make small-scale milling and baking tests to determine the quality of the grain.

- (8) A grain technologist assembles sub-samples for some of the tests
- (9) And seeks to determine how the new varieties will stand up under commercial grain procedure
- (10) Another grain technologist tempers a sample of grain by adding water.
- (11) He starts a sample of new wheat through the milling process in one of Department's small mills, each having three or more "breaks," thus providing facilities for duplicating commercial flour production.
- (12) Transfers freshly milled flour of a new wheat variety to a blender
- (13) And bottles the blended flour for baking and chemical analysis
- (14) He compares the color and volume of bran and flour of an 80% extraction sample with those of a normal 72% extraction sample
- (15) Using a mechanical dough mixer, a baking technologist mixes flour milled from a new wheat with the other ingredients needed to make a small loaf of bread
- (16) The dough rises in the fermentation cabinet
- (17) The test loaves go into the oven with a revolving plate to insure even baking.
- (18) Each loaf of bread is measured for volume
- (19) After the test loaves have stood for 24 hours, they are cut and scored for grain, texture, color of crumb, taste, and odor.
- (20) A laboratory aide examines the freshly baked loaves
- (21) Chemical tests, including a determination of the protein content, reveal the quality of a new wheat variety for commercial acceptance.